THE VETERINARY RECORD

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888

No. 21. MAY 22nd, 1954 VOL. 66.

SOME NOTES ON BALANCED ANAESTHESIA FOR THE DOG AND CAT

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Since their introduction in 1931 the barbiturates have been used extensively as anaesthetic agents in veterinary surgery, almost, in fact, to the exclusion of the volatile and gaseous agents in the case of small animals. They have enjoyed a well-deserved popularity in the hands of those veterinary surgeons who practise single-handed methods of surgery, but it has long been realised that they do not represent ideal surgical anaesthetic agents. When barbiturates are used to produce surgical anaesthesia for the duration of a major surgical intervention, their use entails a prolonged and often violent recovery period. They have relatively little analgesic potency, and thus in order to obtain muscle relaxation and absence of response to painful stimuli, they must be administered in such a fashion as to produce gross respiratory depression which, by causing carbon dioxide retention, results in increased haemorrhage at the operation site. Also, the barbiturate drugs have to be detoxicated in the body and their detoxication imposes additional load on the already strained metabolic processes of a sick patient.

BALANCED ANAESTHESIA

In recent years an attempt has been made to restrict the dosage of the barbiturates to one just sufficient to produce and maintain unconsciousness. Suitable operating conditions are obtained by the use of other agents, either volatile and gaseous anaesthetics or specific analgesic and relaxant drugs. These methods constitute an extension of the "balanced anaesthesia" described by Lundy, the idea of which is to avoid overdosing the patient with any one drug. There is no doubt that the use of balanced anaesthesia significantly improves the patient's chance of survival.

PREMEDICATION

Premedication, a subject which latterly has been neglected in veterinary anaesthesia, has been found to be a very important part of our balanced anaesthetic technique. Not only does it serve to quieten the patient and reduce salivation and bronchial secretions, but by lowering the metabolic rate of the patient, its use enables a very much smaller dose of barbiturate to produce the desired effects. Further, suitable premedication "smooths out" the whole of the subsequent anaesthetic, and in this way is of great assistance to the anaesthetist. No hard and fast dosage scale can be given, each case must be judged on its own merits. The aim is to produce sedation and lowered metabolic rate without unduly reducing the respiratory volume. Arrest of respiration can cause great inconvenience if it occurs unexpectedly during induction of anaesthesia and before an endotracheal tube can be passed. This situation may easily arise if excessive premedication has been given.

APPARATUS

Apparatus for the administration of the gaseous and volatile anaesthetic agents may be very simple, although slightly more elaborate apparatus is of great help to the anaesthetist. For physiological reasons, for all methods other than the simple "rag and bottle" procedure, the essential feature of any apparatus is a reservoir bag so placed that the patient inhales from this bag through *wide-bore* tubing. Expired gases then escape through an expiratory valve for "open circuit" techniques, or pass back into the reservoir bag for "closed circuit" methods. For the "controlled respiration" procedure described below, using closed circuit technique, the apparatus must incorporate a reservoir bag and a canister containing soda-lime, so arranged that the exhaled gases pass through the soda-lime before being inhaled again by the patient. There are two types of system which provide for this, the circle system and the to-and-fro system. The circle system uses an inspiratory and an expiratory tube with flap valves to ensure a one-way flow of gases. Between the inspiratory and expiratory tubes are placed the breathing bag and soda-lime canister. Owing to the cost of such an apparatus, this type of system is only likely to be found in the larger veterinary hospitals. The to-and-fro absorption system is simple, and consists of a soda-lime canister separating the patient from the breathing bag. Fresh gases are fed in on the patient's side of the canister. The soda-lime canisters were designed by Waters after much experimentation

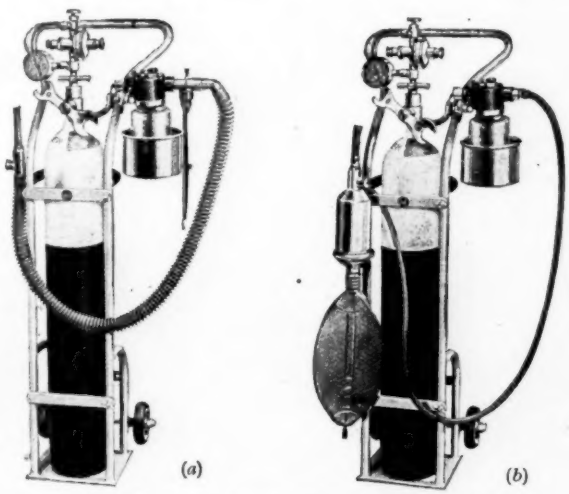

FIG. 1.—B.O.C. Veterinary Oxygen/Ether Apparatus with
(*a*) Magill rebreathing attachment for "open circuit" anaesthesia.
(*b*) Waters canister and fittings for "closed circuit" methods.

as to size and shape, and are obtainable in several sizes.* Owing to the wide variety in the shape of the faces of domestic animals masks are unsatisfactory, and we feel that the absorber should always be connected to the patient by means of a cuffed endotracheal tube. Sizes of tubes beyond the range designed for human use are necessary.† (N.B. This technique thus incorporates all the advantages of the use of endotracheal tubes). An oxygen cylinder with reducing valve and fine adjustment control is essential, while a flow meter for the oxygen is desirable, a Rotameter being the ideal. An expiratory valve is required between the soda-lime canister and the connection to the endotracheal tube. By opening this valve any tendency to overdistension of the breathing bag can be avoided. Apparatus for the introduction of anaesthetic agents—*e.g.*, an ether vaporising bottle or cyclopropane cylinder and key may be introduced as desired. Providing the bore of the breathing system is adequate, too much emphasis should not be placed on the design of the apparatus, since we feel that an appreciation of the physiology of respiration is more important to the anaesthetist if good smooth anaesthesia is to be obtained.

Controlled Respiration

The technique of controlled respiration has been employed in anaesthetic practice for many years. The anaesthetist abolishes all the spontaneous respiratory movements and takes over full control of his patient's breathing, as described by Guedel & Treweek.

It is thought that there are many occasions on which the use of controlled respiration constitutes a help to the patient. Gray & Rees, and Dundee, have produced evidence to show that smaller doses of thiopentone are necessary to maintain unconsciousness in patients whose respiration is controlled than in those in whom there is spontaneous respiration. Breathing into an anaesthetic apparatus must impose an additional strain on the patient, however well designed the apparatus may be. It is better that this strain should be taken by the anaesthetist rather than the patient. Waters has suggested that it may be "desirable to relieve a weak patient from the energy output necessary to contract the diaphragm and intercostal muscles." When respiration is controlled, the anaesthetist can easily produce a stationary diaphragm and lung field to assist the surgeon in upper abdominal and chest surgery. Controlled respiration properly used during any surgical operation ensures an adequate tidal exchange whenever this is likely to be impaired—*e.g.*, when muscle relaxants are being used. Its use during intrathoracic surgery is essential to prevent collapse of the lungs, paradoxical breathing and mediastinal flap.

*1. 16 oz. 13 cm.×18 cm. 3. 5½ oz. 8 cm.×6 cm.
2. 10 oz. 12 cm.× 7 cm. 4. 3 oz. 5·5 cm.×5 cm.

†British Oxygen Company Sizes V3 to V14 "Streamlined" cuffed tubes, or V00 to V14 plain.

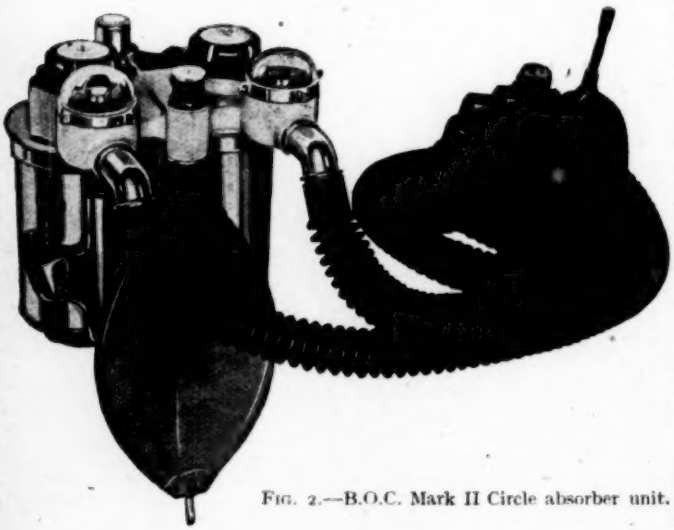

Fig. 2.—B.O.C. Mark II Circle absorber unit.

Production of Apnoea

In order to establish control of the patient's respiration, the anaesthetist must be able to render the patient apnoeic. The main factors involved in the production of apnoea are thought to be:—

1. Depression of the respiratory centre: (*a*) By the premedicant drugs, thiopentone and maintenance anaesthetic agents. These probably act by raising the carbon dioxide threshold level of the centre.
(*b*) By reflex inhibition—overstimulation of the Hering-Breuer reflex from regular cyclical inflation of the lungs by the anaesthetist (*i.e.*, frequent stimulation of the stretch receptors in the lungs resulting in inhibition of the inspiratory centre of the medulla by afferent impulses via the vagus nerve).
2. Lowering of the carbon dioxide content of the blood by manual hyperventilation through soda-lime.
3. Paralysis of the respiratory muscles by the use of relaxant drugs, while anaesthesia is maintained by thiopentone or the gaseous and volatile anaesthetic agents.

Management of Apnoea

Once voluntary respiration has been abolished the interchange of gases is accomplished by gentle rhythmical compression of the breathing bag about 20 to 30 times each minute. With this technique, pressure conditions inside the thorax are disturbed, positive pressure being induced during inspiration, there is thus the possibility that the efficiency of cardiac filling is impaired. It is known that the cardiac output depends on the average intrathoracic pressure, and it cannot be doubted that some types of intermittent positive pressure ventilation of the lungs produce circulatory depression. However, Cournand *et al.* have shown that cardiac output is unaffected if the pressure applied to the lungs is regulated according to a curve which shows a slow rise to a maximum followed by a rapid fall to zero pressure, then a pause at least as long as the period of inflation before the next cycle commences. The understanding and application of the correct type of lung inflation is an essential part of the controlled respiration technique. It should be noted, too, that any machine used to produce inflation of the lungs by mechanical means, must be capable of giving this correct type of pressure curve.

Signs of Anaesthesia

While controlled respiration is in progress, the normal respiratory signs of anaesthesia are abolished, and the problem arises how to assess the depth of unconsciousness of the patient. A little practice is necessary to accomplish this successfully, but the following notes should be of assistance:—

1. The anaesthetist ought to know the effects and duration of the effects produced by the premedicant drugs, induction dose of thiopentone, etc., in the absence of the relaxant drugs and the controlled respiration technique. He

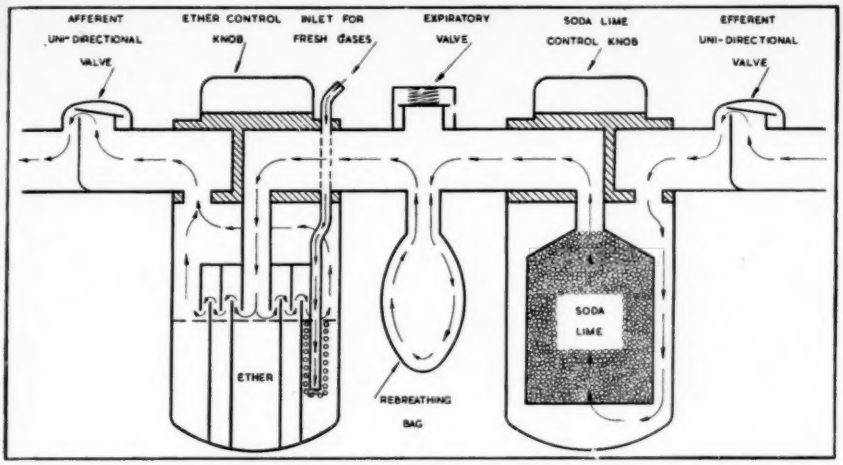

Fig. 3.—B.O.C. Circle absorber unit circuit diagram.

should be familiar not only with the probable effects of the individual drugs, but also of their combinations, and he should be capable of predicting their effects bearing in mind such factors as time of administration, age, sex, physical condition, species and breed of the patient concerned.

2. Given an adequate depth of unconsciousness, there should be very little resistance to inflation of the lungs once controlled respiration has been instituted. In the absence of an obstructed airway, any increase in the pressure it is necessary to exert on the breathing bag in order to inflate the lungs, may indicate that the depth of unconsciousness is becoming too shallow. It is important that the anaesthetist should appreciate the " feel " of the breathing bag during controlled respiration.

3. Careful and frequent observation of the pulse rate will enable the anaesthetist to recognise the occurrence of the " cardiac pain reflex " of Longley & Croft if analgesia is not adequate.

4. With a depth of unconsciousness which is too shallow, noxious stimuli will produce reflex movements of the face muscles, trunk and limbs of the patient.

5. Failure to observe these details will result finally in the onset of shock. (A rising pulse-rate due to the onset of surgical shock during an operation must not be confused with the occurrence of the cardiac pain reflex.)

Termination of Apnoea

No difficulty should be experienced when it is desired to terminate controlled respiration, provided that the problem is approached in the following manner:—

(*a*) Allow some accumulation of carbon dioxide by (i) removal of the soda-lime, and (ii) adopting a slower rate of lung inflation.

(*b*) Dilute the anaesthetic mixture with oxygen.

(*c*) Where possible, attend to any residual curarisation by the intravenous administration of atropine and neostigmine. (Note: neostigmine is the antidote to those relaxants which have a true curare-like action, and its use is contra-indicated where depolarising agents, e.g., succinylcholine chloride, have been employed.)

It should be noted that while the establishment of apnoea is usually largely due to respiratory depressant and relaxant drugs, the aim is to have their effect minimal at the end of the operation. Apnoea should then depend mainly on hyperventilation with carbon dioxide removal, when a prompt resumption of adequate spontaneous breathing may be easily attained when desired by the adoption of measure (*a*), and if necessary (*b*).

At all times, care must be taken to avoid anoxia, *i.e.*, lung inflation must be assisted by manual pressure on the breathing bag until spontaneous respiratory movements are adequate for the provision of satisfactory gaseous exchange.

Selected Cases

A number of cases selected from our records are described below to illustrate the actual procedures adopted in the administration of a " balanced " anaesthetic.

1. *Boxer. Female. Six years.* 57 *lb. Ovarohysterectomy for " pyometra "*

Pre-operative examination revealed a very dull, dehydrated and toxic animal, with a temperature of 98·2° F. She was considered a very poor operative risk.

Fifty minutes prior to anaesthetisation 1/6 grain " Omnopon " (Roche) and 1/200 grain Scopolamine were given by sub-cutaneous injection. Anaesthesia was induced with 0·3 gramme. Thiopentone sodium given cautiously by slow intravenous injection. After intubation with a cuffed endotracheal tube anaesthesia was maintained by nitrous oxide, oxygen and minimal amounts of ether, using a carbon dioxide absorption technique. Adequate abdominal relaxation was secured with 30 mg. gallamine triethiodide, and respirations were controlled. An intravenous drip infusion of dextran was commenced immediately anaesthesia was stabilised.

After closure of the peritoneum, 1/200 grain atropine sulphate and 2·5 mg. neostigmine were given to overcome all residual curarisation.

Normal respiration was promptly resumed. The administration of the anaesthetic gases was terminated as the surgeon completed closure of the skin wound. 540 ml. of dextran had been given during the operation.

Recovery from the anaesthetic was rapid. The control of some post-operative restlessness, believed to be due to pain, necessitated the injection of 50 mg. pethidine hydrochloride. The subsequent post-operative progress was smooth and uneventful.

2. *Miniature Poodle. Male. Five years.* 16 *lb. Aural resection.*

The operation of aural resection involes a high degree of surgical stimulation and anaesthesia often presents difficulties if the surgeon is to be given ideal operating conditions. Similar difficulties are encountered during any operation on other highly sensitive regions of the body. In this case the procedure described below resulted in very satisfactory operating conditions.

Anaesthesia was induced in this case with 0·2 gramme thiopentone sodium, the premedication of 50 mg. pethidine hydrochloride and 1/200 grain atropine sulphate having been given 55 minutes previously. Anaesthesia was main-

tained with nitrous oxide, oxygen and minimal amounts of ether via a cuffed endotracheal tube, with carbon dioxide absorption. Respiration was controlled throughout the 40 minutes' duration of the operation. After the bandaging of the wound some carbon dioxide accumulation was allowed and spontaneous respiration was promptly resumed. Recovery to full consciousness was quiet and rapid.

3. *Scottish Terrier. Female. Five years.* 19 *lb. Transthoracic oesophagotomy*

This animal was very dull and depressed, so premedication was restricted to 1/200 grain scopolamine given subcutaneously 45 minutes prior to anaesthetisation.

Anaesthesia was induced with 0·25 gramme thiopentone sodium and maintained with cyclopropane/oxygen via a No. 8 cuffed endotracheal tube with carbon dioxide absorption. 2 mg. of active cation of ethosuccinium bromide enabled controlled respiration to be instituted. Care was taken to hold the lungs fully inflated as the chest was finally closed to assist in the prevention of pneumothorax. Removal of the soda-lime from the anaesthetic circuit resulted in resumption of spontaneous respiration. Administration of the anaesthetic gases was continued right up to the end of the operation.

Recovery from the anaesthetic was rapid, and there were no post-operative respiratory complications other than a degree of tachypnoea which persisted for about 48 hours. In this case no post-operative chest aspiration was performed.

4. *Cat. Male. Five months.* 3 *lb. Repair of ruptured diaphragm.*

On pre-operative examination the cat exhibited very severe respiratory distress. Radiographs showed normal lung tissue to be confined to the left apical region, and the heart displaced to the left. A dilated gas-filled stomach occupied the whole of the right half of the abdomen.

The animal was handled very quietly, care being taken to avoid causing any fear or excitement. Premedication consisted of 1/200 grain atropine sulphate given parenterally 45 minutes before the time of operation. A mask through which oxygen was flowing at 5 litres per minute was held just in front of the cat's face, and anaesthesia induced with 0 075 gramme thiopentone sodium. 5 mg. of succinylcholine chloride were given from a separate syringe but through the same intravenous needle as the thiopentone. After rapid intubation with a No. 2 plain Magill tube anaesthesia was maintained with cyclopropane/oxygen, using a small soda-lime container for carbon dioxide absorption. Respirations were controlled. After return of the abdominal contents to the abdomen (the liver spleen, omentum, small intestine and part of the colon had all entered the thoracic cavity through a rent in the right half of the diaphragm), the right diaphragmatic lobe was assisted to complete re-expansion by the controlled respiration procedure. The lungs were held fully inflated as the rent in the diaphragm was finally closed, and spontaneous respiration returned as soon as some carbon dioxide accumulation was allowed to occur. The administration of cyclopropane/oxygen was continued until the operation was complete. Respiratory embarrassment due to the dilated stomach was relieved by the passage of a stomach tube.

An attempt was made to perform post-operative chest aspiration through an indwelling polythene drain, but this became dislodged and aspiration was performed on three occasions, at four-hourly intervals, via an ordinary paracentesis needle. Post-operative progress was quite uneventful.

The main anaesthetic risks encountered in this type of case are:—

(*a*) The production of respiratory insufficiency either by increasing the metabolic rate through careless handling, or by anaesthetic depression before controlled respiration can be established.

(*b*) Regurgitation and aspiration of the stomach contents following relaxation of the cardiac sphincter as anaesthesia is induced.

5. *Cocker Spaniel. Male. Five years.* 28½ *lb. Myelogram*

Fifty mg. pethidine hydrochloride and 1/200 grain scopolamine were given as premedication 50 minutes prior to anaesthetisation.

After induction with 0·25 gramme thiopentone sodium anaesthesia was maintained with nitrous oxide, oxygen and minimal amounts of "Trilene" via a No. 9 cuffed endotracheal tube, using a semi-closed re-breathing apparatus with the expiratory valve fully open. Anaesthesia was maintained for three and a half hours and during this time small additional doses of thiopentone sodium were given as required, a total of 0·125 gramme being used in this period. Recovery from anaesthesia was quiet and uneventful.

A very light plane of anaesthesia may be maintained for long periods of time in this manner using minimal doses of anaesthetic drugs—provided that surgical stimulation is minimal.

Discussion

Up to the end of May, 1953, "balanced anaesthesia" has been employed for more than 400 surgical cases, and careful records have been kept for 395 of these cases. Controlled respiration has been used on 171 occasions. Excluding the cases destroyed as inoperable (5), the total mortality from all causes has been 14 animals. Examination of our records shows that the anaesthetic alone can be held responsible for death in only two of these animals. Unfortunately, no mortality figures are available for the period immediately prior to the institution of these anaesthetic methods, but it is the opinion of experienced surgeons that if such figures were available, they would demonstrate a very great reduction in the deaths attributed to anaesthesia since the introduction of these modern techniques.

It has been shown that the degree of muscle relaxation attained and the freedom from "ooze" at the operation site, greatly facilitate the work of the surgeon. The immediate post-operative condition of the patient is improved, shock is less evident, and the period of restless pain-ridden narcosis can be eliminated. It should be remembered, however, that the object is to attain a quiet, pain-free recovery, and not necessarily an ultra-rapid recovery to full consciousness.

The methods described have been used with very satisfactory results for the cat, dog, sheep, goat, calf and monkey.

Anaesthesia of equine subjects has been found to present many difficulties and it is considered that much more research into anaesthetic methods and agents for this species is urgently required if results comparable to those achieved on other species are to be attained.

The techniques outlined in this paper have been found to present two disadvantages.

1. In the dog and sheep, use of a closed circuit with soda-lime for carbon dioxide absorption has tended to cause excessive heat retention, and heat stroke has been produced in this way.

2. To obtain maximum benefit from the use of "balanced" anaesthetic methods, the complete attention of a skilled anaesthetist throughout the operation is a necessity. While this may not always be possible under existing conditions of general practice, it is believed that the acquisition of some degree of special ability and skill in the administration of anaesthetics by one member of the *qualified* staff of the practice would result in a lower mortality rate among the surgical cases.

Summary

Means of reducing the dosage of barbiturates used for general anaesthesia for all types of surgical interferences in the domestic animals are described. The apparatus for, and the technique of, controlled respiration is outlined. Five case notes are given to illustrate the techniques mentioned.

Acknowledgments.—The authors wish to express their thanks to Mr. G. C. Knight, without whose active help, encouragement and co-operation it would have been impossible to undertake this work. Professor E. C. Amoroso, Dr. A. J. H. Hewer and Dr. H. Youngman gave much help, advice and encouragement. We also wish to thank the British Oxygen Company for the loan of blocks for the illustrations, and for the assistance of their representative, Mr. L. E. Fuller, who has been most helpful in the design and modification of various pieces of anaesthetic equipment.

One of us (L. W. H.) was working with the aid of an Animal Health Trust Research Scholarship Award.

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V.V.B.F. DANCE AT ABERDEEN

Following upon last year's dinner and dance, a second highly successful function in aid of the Victoria Veterinary Benevolent Fund was held in the Northern Hotel, Aberdeen, on March 25th. It took the form of a supper-dance, organised by a committee of ladies headed by Mrs. Q. M. Service, Ellon.

The company—veterinary surgeons, their wives and friends—numbered in all some 150, the chief guest being Mr. S. L. Hignett, Frant, who previously that day had addressed a meeting of the North of Scotland Division. Prizes for a raffle organised in conjunction with the dance were generously donated by members and friends of the profession in the north of Scotland.

In view of the success of the function, and the good cause it serves, it is to be hoped that it has now become established as an annual event and that it will attract even greater support in future years. Mrs. Service and her hard-working committee must be thanked and heartily congratulated for their efforts. As a result of this year's dance and the associated raffle, it is understood that the V.V.B.F. will benefit by £70.

THE USE OF PENICILLIN IN VACCINE CULTURES OF THE CAUSAL ORGANISMS OF CONTAGIOUS BOVINE PLEUROPNEUMONIA (*ASTEROCOCCUS BOVIS*)*

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In a previous report (White, 1952), it was shown that the growth of *Asterococcus bovis* in serum broth is unaffected by the addition of penicillin in relatively large amounts, as judged by tube dilution counts. The highest level then tried—10,000 units per c.c.—did not interfere with growth. Since then it has been found that growth is prevented at a level of 50,000 units per c.c. This confirms the observation made by Pulvertaft (1953), who also noted that growth occurred with penicillin at 25,000 units per c.c. in his sloppy agar medium.

The use of penicillin to control contamination during the preparation of culture vaccines for contagious bovine pleuropneumonia would obviously be of great assistance. Vaccine consisting of a serum broth culture of an attenuated strain of the organism (Bennett, 1932) has been, and still is, widely used. The work here reported was done with this type of vaccine.

In Khartoum, the problem of air-borne contamination in routine bacteriological work on any scale, such as is involved in contagious bovine pleuropneumonia vaccine production, is a particularly difficult one, owing to the dryness of the atmosphere and the prevalence of dust most of the year, with severe dust storms at certain times.

When using any selective inhibitory substance in the preparation of the vaccine it is essential to know whether such a substance will bring about any resurgence in virulence of the organism, or will affect its immunising power. Penicillin was chosen from the selective inhibitory substances previously described (White, 1952) because it disappears as penicillin from the vaccine in a short time, because it is readily available and easy to use, and because it is unlikely to have any toxic risk. The experiments here described were designed to confirm effectiveness in controlling contamination, and to test the possibilities regarding resurgence of virulence. Experimental work to check the immunising power of penicillin treated vaccine is being completed, and will be the subject of a later paper.

Control of Contamination during Vaccine Production

In order to make sure that the experimental results previously obtained (White, 1952) would be applicable under routine production conditions, penicillin was added to part of batches of the serum broth culture vaccine which is in normal production in this laboratory in bottles of 50 and 100 c.c. A level of 100 units per c.c. was adhered to throughout. The culture vaccine was dosed twice, first at the time of seeding, and again after three days' incubation, at the time when the bottles are corked. Crystalline penicillin "G" (Imperial Chemical Industries) was used throughout and was dissolved in either broth or saline immediately before addition to the vaccine. The medium used is 10 per cent. horse serum in ox heart infusion broth, the total incubation time is one week from seeding, bottles

*In view of the present uncertainty regarding nomenclature, the name *Asterococcus bovis* is adhered to for convenience. It is identical with *A. mycoides*.

are corked three days after seeding and are ready for issue four days later. The incidence of contamination in untreated vaccine averages over 30 per cent., and may reach 80 per cent. Batches normally consist of 150 to 200 bottles, and the output of vaccine averages 30,000 doses of 1 c.c. per week throughout the year.

The primary seed cultures, maintained in serum glycerol broth in tubes, were not, and have never been, in contact with penicillin.

The comparison of the incidence of contamination in the penicillin treated part batches with the untreated parts of the same batches is shown in Table I. Contaminated bottles are judged by careful visual examination, using a lens. It will be seen that under production conditions the control is very good. In addition to the evidence in Table I, 61 batches of vaccine consisting of 11,942 bottles and prepared over a period of five and a half months have since been penicillin treated; the average contamination rate has been 12 per cent., the highest and lowest single batch figures have been 47 and 0 per cent. respectively. Comparative figures for the vaccine prepared in the same period of the year 12 months earlier, without penicillin treatment, were—average 37 per cent., lowest single batch 12 per cent., highest single batch 75 per cent.

It had been found in preliminary tests that a single dosing with penicillin at seeding was not satisfactory owing to the rapid disappearance of the penicillin between seeding and corking. A rough check of this, using the Oxford staphylococcus sown at daily intervals in tubes of penicillin dosed serum broth kept at 37° C., indicated a very sharp fall in penicillin level. Precise information was obtained by the laboratories of Imperial Chemical (Pharmaceuticals) Ltd., in England, where Dr. A. R. Martin kindly arranged for estimations of penicillin in serum broth at intervals after incubation. Their results, shown below indicate that after three days approximately four-fifths of the penicillin have disappeared.

	Days Storage at 37° C						Initial *p*H	*p*H After 10 Days
	0	1	2	3	6	10		
Units c.c. Penicillin.	100	62	36	22	4	0	7·2	7·2

Experiment with Penicillin Treated Vaccine in Cattle

Eighteen average young bulls, all negative to the slide flocculation test (Priestley, 1951), were divided into two equal groups. In each group, two animals received normal untreated vaccine, three animals received vaccine treated with penicillin at 10 units per c.c., and four received vaccine treated with penicillin at 100 units per c.c. For one group the current attentuated vaccine strain of *A. bovis* was used at generation 96; in the other group the same strain of organism, but at generation 60, was used. The generation 60 culture was known to be insufficiently attenuated for safe vaccine use, and to cause marked local reactions in a proportion of animals. It was included so that any possibility of resurgence in virulence caused by penicillin might definitely be shown up.

The vaccine used in this experiment was a specially prepared lot, and did not form part of any routine batch. It was dosed only once with penicillin, at seeding, the limitations of this single dosing not having become apparent then. Considerable trouble with contamination was experienced at the level of 10 units of penicillin per c.c.

Vaccination was done in the manner normally adopted in the field, *i.e.*, 1 c.c. subcutaneously behind the shoulder.

One of the control (untreated vaccine) animals of the generation 60 group reacted severely with a typical swelling such as is produced with a virulent culture of *A. bovis* at the site of inoculation and died 24 days after vaccination. Of the three animals receiving generation 60 treated with 10 units of penicillin per c.c., one reacted with a swelling at the inoculation site which receded three weeks later. Of the four animals receiving generation 60 treated with 100 units of penicillin per c.c., one reacted very late with a swelling which receded rapidly, and one showed a temporary dullness. None of the animals receiving generation 96, either with or without penicillin showed any reaction.

Thirty-nine days after vaccination, the remaining 17 animals were slide flocculation tested and found to be positive. Fifty-two days after vaccination, these animals were challenged by the subcutaneous injection behind the shoulder, on the side opposite to the vaccination site, of 1 c.c. of a five-day serum broth culture of a virulent (second generation) culture of *A. bovis*. At the same time, three unvaccinated bulls which gave negative results to the slide flocculation test, were also injected with the virulent culture as challenge controls. Penicillin was not used in the culture of virulent challenge organisms.

Twenty days after the challenge, two of the challenged controls died, having reacted severely at the site of injection. The remaining challenge control was unaffected, but developed theileria infection seven days after injection, and was successfully treated with Pirevan. All the vaccinated animals survived the challenge test, and only one —an animal which had received generation 96 vaccine treated with 100 units of penicillin per c.c.—developed a small swelling; this never became serious, and gradually receded. After two months all the vaccinated animals had remained healthy, and were used for other work.

Table I

Comparison of Contamination in Penicillin Treated and Untreated Parts of the Same Batches of Contagious Bovine Pleuropneumonia Culture Vaccine. Bottles Corked at Three Days

	Untreated				Penicillin Treated			
Vaccine Batch	Bottles sown	Bottles contaminated at three days	Bottles contaminated at seven days	Total contamination per cent.	Bottles sown	Bottles contaminated at three days	Bottles contaminated at seven days	Total contamination per cent.
52/100	105	6	15	20·0	95	0	3	3·2
52/103	116	6	32	32·8	56	0	3	5·3
52/106	98	9	30	39·8	102	0	6	5·9
52/110	102	4	25	28·4	90	0	14	15·5
52/122	169	27	52	47·0	100	9	2	11·0
52/125	182	25	42	37·0	99	3	4	7·0

This experiment did not indicate any resurgence in virulence in penicillin treated vaccine, and the vaccinated animals were protected against challenge. The number of animals used was very small, and the experimental vaccine was dosed with penicillin only once—at seeding.

Field Safety Trial with Penicillin Treated Vaccine

Thirteen thousand and eight hundred doses of penicillin treated vaccine from the part batches described earlier under " control of contamination," were issued in lots of up to 4,000 doses to veterinary inspectors, against ordinary vaccine demands, along with at least equal quantities of untreated vaccine. In two cases only were adverse reports received. One of these related to the use of 300 doses each of penicillin treated and of normal vaccine; the former gave rise to four deaths, the latter to two deaths. The other case concerned the injection of 4,000 doses of penicillin treated vaccine, when 50 animals died; at the same time 3,000 doses of normal vaccine were used and 29 animals died; a proportion of these animals had received goat attenuated rinderpest virus or rabbit attenuated rinderpest virus at the same time. Adverse reports on normal untreated vaccines being issued in large quantities during this period were being received.

From this field trial no evidence of resurgence in virulence of the vaccine attributable to the use of penicillin in the manner described could be found. The vaccine had been dosed twice, at seeding and again at corking, with 100 units per c.c. of penicillin.

The question whether this vaccine successfully immunised the cattle is one which would be very difficult indeed to answer in detail; precise information is not likely to be available.

Discussion

The value of penicillin in controlling contamination in culture vaccine during production is obvious, and the saving in labour and material is substantial. Gross contamination with penicillin resistant bacteria is very unlikely to occur under ordinary production conditions. It has, however, been experienced on at least one occasion here, when very heavy contamination yielded a fluorescent gram-negative bacillus on culture.

Penicillin has been used frequently under various conditions here in experimental work with *A. bovis*, as distinct from routine vaccine production, and has proved uniformly successful. The production of large volumes of serum broth cultures for the preparation of antigen, previously not a practical proposition in this laboratory, is now regularly undertaken, using penicillin.

Sheriff & Piercy (1952) have claimed that *A. bovis* can apparently be successfully attenuated in egg embryos, and the use of freeze dried egg embryo vaccine has been envisaged; penicillin would be of undoubted value in the preparation of this type of vaccine as a means of controlling contamination in inoculated embryos.

The experiments here reported have failed to indicate that any resurgence in virulence of the attenuated cultures of *A. bovis* results from the use of penicillin. This is a point of some importance in view of the unexplained accidents which do occur with this vaccine, sometimes with strains which have remained safe over a long period of time, and through repeated subcultures.

There are no theoretical grounds for expecting penicillin to have any effect on the immunising power of contagious bovine pleuropneumonia culture vaccine, but experiments designed to test this are now proceeding, and the results will be reported in a later paper.

Summary

The use of penicillin, applied at 100 units per c.c., twice during the production of contagious bovine pleuropneumonia culture vaccine is shown to reduce contamination very substantially. In a small experiment in cattle no resurgence in virulence could be demonstrated, and the cattle were successfully immunised. A field safety trial involving the use of over 13,000 doses of vaccine, also failed to demonstrate any untoward effect attributable to the use of penicillin. The immunising power of penicillin treated vaccine is under test.

Acknowledgments.—This work was carried out at the Veterinary Research Laboratory, Khartoum, and is published with the permission of the Director of Sudan Veterinary Service. Mr. J. A. Aspey, A.I.M.L.T., endured the interpolation of penicillin treated half batches of vaccine in routine production. I have to acknowledge technical assistance from Hassan Eff. El Faki Ibrahim.

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HAS THE HORSE BECOME OBSOLETE?*

BY

JOHN S. BARRINGTON

In the year 1767, after patenting a steam engine for haulage and land cultivation, Francis Moore declared that horses were doomed, and urged his friends to sell theirs " before horse prices slumped." James Wyllie, viewing the position in 1937, said " farmers are still depending on the horse as the primary source of power on farms, the tractor being regarded as a supplement rather than a substitute." Moore was something of an optimist, for, in spite of much boosting by means of prizes and propaganda, steam cultivation never seriously challenged horses; steam tackle was too expensive, too heavy, too awkward in manoeuvre, and too ill-adapted to general tillage operations to command widespread support during the next 150 years when both labour and horses were cheap.

The two world wars gave a spurt to tractors, and now it would be true to say that the tractor is the primary source of power, while the horse plays a supplementary rôle. Tractor production in the United Kingdom rose from a mere 10,000 in 1938 to 124,000 in 1952, though oversea markets absorbed some 50 per cent. of this increase.

Over much of Europe the main reason for the spurt was the enormous horse wastage. In the occupied countries during the last war the wastage was approximately 3,000,000 (not including the U.S.S.R.). France lost nearly a million slaughtered for food or sent to Germany. She had barely 20,000 usable tractors left by the time of the Liberation. In war-torn Europe the tractor was able to come to the rescue faster than horses could be bred to restore production, so it was of necessity adopted on many Continental farms whether the farmer considered its use economic or not. In Britain there was no horse wastage

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due to enemy occupation, but farmers were more mechanically minded and had developed a tractor tradition due to a more pressing need to save labour; moreover, rough land never previously ploughed often called for a powerful machine, so post-war Britain turned eagerly to tractors. The adult horse numbers have dropped by no less than 65 per cent. since 1939, and we now have more tractors to 100 acres of cultivated land than any other country in the world. In Denmark, however, horse numbers show a fall of but 33 per cent. over the same period. France has made good her wartime losses to some extent and still has well over 2,000,000 horses and mules, and, in addition, uses considerable numbers of oxen. In fact, over the last 25 years, France's horse numbers have fallen little more than 20 per cent.

Horses Still Needed

In Sweden there has been a fall of about 30 per cent. since 1939 and horses are still considered indispensable for forestry work in some districts. In the Netherlands the horse is by no means unpopular; western Germany uses over a million; and in Italy and Spain numbers are actually increasing. If we look across the Atlantic we find some 5,500,000 working horses and mules in the United States, in spite of the large switch over to mechanisation, which has resulted in about the same percentage decrease as in the United Kingdom. Statistics apart, the position of the horse in Continental agriculture may be judged to some extent by a visit to the international Agricultural Machinery Exhibition in Paris, where many of the lighter machines, including some pick-up balers, are still designed primarily for animal traction—indeed, almost 75 per cent. of Continental farm draught power is supplied by animals.

In this country the emphasis on farm mechanisation has led to many unfortunate horse versus tractor arguments. Statements such as: " It takes 5 acres to feed a horse which can only work 22 " ; " a farmer spends a full month in every year looking after each horse " ; or " the horse is a waster of land " are either grossly exaggerated or absurd. Horse or tractor may be the more economical according to the circumstances, for holdings differ as regards soil, size and situation, type of farming pursued, method of disposal of produce, and amount of working capital available.

Hours of Work

In southern England horses will often work some 1,300 hours a year and tractors 1,500—though the duration of work is much shorter in the northern counties. But it does not follow that where tractors are introduced to supplement horses or where horses are maintained to supplement tractors their respective uses are necessarily economical; indeed, one post-war survey gave prominence to two " well-managed " farms where the farm tractors worked 555 and 420 hours respectively, while a more recent survey mentions three farms where the horses employed averaged a mere 77 hours a horse a year.

On a properly organised farm if the cost of a " horse hour " is put at x pence, a " tractor hour " will usually work out at about $3x$ pence, but while there is some evidence that improved crops result from horse ploughing, there is little evidence to the effect that mechanised cultivation increases crop yields to any appreciable extent. A team of horses has certain advantages in that its use causes less compaction of soil, and it can work under wetter conditions, seldom breaks down, and can subsist on farm crops, leaving oil reserves for national defence needs; moreover, a team possesses the supreme advantage of divisibility.

However, as far as costings go, they tend to prove that, except for jobs involving short hauls and long waits, such as feeding livestock, transporting manure, and seeds, the farm draught horse is not very economical except on the smaller farms for which machinery cannot be scaled down satisfactorily.

Indeed, mechanisation often means an increase in the economic risks involved in farming, for the cost is substantial and in the United States the mortgage debts incurred following a switch over to full mechanisation have led to a shift in the ownership of farms from farmers to centralised lending agencies.

In saving horse labour by mechanisation have our farmers lowered the cost of production? It seems to the writer that this has not always been the case and that there is still an important part for the horse to play.

CLINICAL COMMUNICATION

ENCEPHALITIS DUE TO ERYSIPELOTHRIX MONOCYTOGENES (CIRCLING DISEASE) IN THE OX*

A brief review and report of two cases observed in this country

E. WYNN JONES,
University of Bristol

Diseases of domestic animals due to *Erysipelothrix monocytogenes* was first recorded by Gill (1931, 1937), who recovered it from the brain of sheep in New Zealand. He called the condition Circling Disease. The organism has since been recovered from the horse, cow, goat, pig, dog, fox, rabbit, chicken and man. The disease syndrome associated with this organism varies somewhat with the species affected. Encephalitis, meningitis, and encephalomyelitis are seen especially in ruminants and man. The organism was first recognised by Murray, Webb & Swann (1926) who isolated it from laboratory animals in this country.

Encephalitis of cattle with lesions similar to those typical of *E. monocytogenes* infection of the brain was recorded by Mathews (1928) and Jones & Little (1934) in the U.S.A. Fincher (1935) also recorded a similar encephalitis in cattle in the U.S.A. and isolated a gram-positive rod-shaped organism. The presence of circling disease in cattle has since been confirmed on numerous occasions in North America. It has also been recorded on the continent of Europe (Scaaf, de Jong & de Jong, 1951; Naerland, 1950; Schoop, 1951; Belin, 1946; Van Dorssen & Jansen, 1951). Since the isolation of the organism in this country, it has been reported to cause meningitis in man (Webb, 1943), septicaemia in poultry (Paterson, 1937, 1939) hepatitis and enteritis in a calf (Harbour, 1941), hepatitis in voles (Levi, 1948), and abortion in sheep (Wramby, 1944).

The disease may affect young or adult animals. It is, however, more commonly seen in the young, in which it appears to run a more rapid course. Morbidity is low and usually well below 10 per cent., while sporadic cases are

* This organism was previously known as *Listerella monocytogenes*, the condition referred to as Listerellosis.

not uncommon. The percentage mortality is high, especially in sheep. The origin of the infection is not known. Gill (1931, 1937) suggested that *Oestrus ovis* larvae were concerned in the transmission of the disease in the sheep. Cases have, however, been recorded in the absence of this parasite. The organism can persist at room temperature for some considerable time (Levi, 1948), and since it has been recovered from disease in sheep, from rodents, from cases of mastitis (Wramby, 1944) and from poultry, it has been suggested that carriers may play a part in transmitting the disease. Diet and management may also be predisposing factors, since the condition usually occurs in winter and spring. It has been suggested that winter feeding and consequent lowered resistance is a predisposing factor. Olafson (1940) suggested that feeding of silage may be related to the development of the disease, since many outbreaks occurred in animals fed silage. An experiment to attempt to prove or disprove this was inconclusive (Olson, Cook & Bagdonas, 1951).

The first symptoms usually noticed are listlessness and segregation from the other animals. The animal may be wandering aimlessly about apparently blind, or the owner may experience difficulty in tying it up or bringing it in from pasture. Shortly afterwards abnormalities of equilibrium develop. There may be some staggering and the head is often held low down or to one side. The animal may even stand with its head pressed against the wall or continually press forwards in its stanchion. Upon closer examination varying degress of facial paralysis, as evidenced by ptosis and drooping of the ear and upper lip on the affected side, are often found to be present. In addition, the nostril on the same side may be partially collapsed and varying degrees of strabismus occasionally occur. The facial paralysis may at times be bilateral. The presence of conjunctivitis, keratitis and corneal opacities have also been occasionally recorded. Drooling of saliva from the affected side and the accumulation of food in the cheek afford further evidence of facial paralysis.

The animal may be hyperaesthetic or excited, or fine muscle tremors may be seen. The temperature may or may not be elevated; the pulse is accelerated, and some degree of anorexia is usually present. When facial paralysis first appears, the animal will, if loose in the box, often circle away from the paralysed side. The circle is often such that the animal uses one of its hind legs as a pivot. Ability to stand is eventually lost and paddling movements of the legs are seen, while death usually occurs in from 3 to 10 days from the onset of symptoms. At autopsy few or no macroscopic lesions exist although increased and cloudy cerebrospinal fluid, and small foci of necrosis in the brain stem may be observed. Microscopically, lesions are most commonly found in the mid-brain and include perivascular cuffing with lymphocytes, monocytes, polymorphonuclear, and eosinophilic leucocytes, and small independent foci of neutrophilic infiltration. Olafson (1940) considers the latter to be diagnostic. Meningitis may also be present.

Clinical diagnosis is based upon the symptoms of facial paralysis and circling. Examination of the blood and cerebrospinal fluid may assist. Monocytosis, although described, is not as characteristic of the disease in the ruminant as it is in the laboratory animal. A negative result does not, therefore, exclude the diagnosis of his condition. Agglutination tests have not been found to be of any help. Diagnosis is confirmed at autopsy by culture of the mid-brain, comparatively large amounts being required, and by histopathological study. The disease should be distinguished from tuberculous meningitis, metabolic disorders, especially acute acetonaemia, lead poisoning and localised lesions of the brain such as tumours and abscesses.

Treatment is of little value unless commenced at an early stage. It has been reported that the organism is insensitive to penicillin, streptomycin, terramycin and choromycetin, but that it is sensitive to aureomycin (Zink, de Mellow & Burkhart, 1951).

The First Case

Two cases have been observed in May, 1953 in a herd of forty Guernsey cattle in this country. The first animal to become affected was a Guernsey heifer (two years nine months old) which had calved three months previously and which was now six weeks pregnant. The animal was in good condition, was at pasture, and was in addition receiving a small amount of hay and cake. The first symptoms observed were loss of appetite, a fall in milk yield, salivation, and dropping of food from the mouth. The attendant assumed that the animal was suffering from "wooden tongue." Three days later it was noticed that the animal was unsteady, difficult to tie up and would occasionally lean against the wall. In the latter case, it was the right side of the head which was always pressed against the wall. In addition, the temperature was elevated (103·4° F.), the pulse accelerated, the animal was hyperaesthetic, and there was an "S" shaped curvature of the spine, the head being deviated slightly to the right. There was no evidence of acetonaemia.

In view of the hyperaesthesia, 2 oz. of magnesium sulphate as a 20 per cent. solution were injected subcutaneously, a blood sample having previously been taken for estimation of blood calcium, phosphorus and magnesium. The results were later found to be within the normal range. The following day the animal had developed a left facial paralysis manifested by drooping of the left ear and upper lip, ptosis and accumulation of food in the left cheek. Ophthalmological examination revealed no abnormality. Since the animal had been struggling in the stanchion, the paralysis was thought to be of traumatic origin. A further dose of magnesium sulphate was administered. The next day the animal was dehydrated owing to the fact that it was unable to swallow, the facial paralysis had become bilateral, and when loose in the box it circled in a clockwise direction. The hyperaesthesia was still present. The animal was not seen again, since it died during the night. No gross lesions were apparent at autopsy. The brain was removed for histological study. Sections of the mid-brain revealed lesions typical of *E. monocytogenes* infection, foci of polymorphonuclear infiltration and perivascular cuffing with mononuclear and polymorphonuclear cells being present. The organism was not isolated from the brain.

The Second Case

The second case observed was a nine-month-old heifer calf. Again, the animal was in good condition and was housed in a semi-closed yard together with a number of other calves. These animals were receiving calf rearing nuts, dried grass, and good quality hay. The brand of calf nuts had, however, been changed during the last 10 days and the animals showed some reluctance to eat the new variety. As a result of this, the attendant considered there had been some slight loss of condition. In addition, during the period, the calves had been bedded down with some mouldy hay which some of them had been seen eating. There had been no obvious direct contact between

this animal and the previous case. Symptoms were first noticed 10 days after the onset of disease in the previous case. The animal was seen wandering aimlessly about the yard apparently blind. Occasionally it would rest its head against the wall, as did the previous case. Complete anorexia was present. The following day it began to circle in a clockwise direction.

At examination the calf was found leaning against the wall of the box, the head lowered and extended. When urged to move, it began to circle in a clockwise direction. The right hind fetlock was knuckled, and left facial paralysis, manifested by ptosis, drooping of the ear and the upper lip on the left side, and partial collapse of the left nostril was present. The temperature was 104·2° and the pulse accelerated. The animal also had slight diarrhoea. Samples of blood and cerebrospinal fluid, the latter from the lumbosacral space, were taken for examination. The blood sample showed evidence of monocytosis, while the cerebrospinal fluid contained an increased number of cells, many of which were monocytes (see below).

	Total White Blood Cells per cu. m.m.	Differential Count Polymorphs per cent.	Lymphocytes per cent.	Monocytes per cent.
First Sample				
Cerebrospinal Fluid	178	2	82	16
Blood	7,300	8	72	20
Second Sample (24 hours later)				
Cerebrospinal Fluid	580	8	84	14
Blood	6,700	12	70	18

(Eosinophils were absent from all samples)

Two grammes of streptomycin and 2½ megas of penicillin sodium salt were given subcutaneously. A further 0·5 megas of penicillin sodium salt were given intrathecally.

Symptoms were similar on the following day when a further sample of blood and cerebrospinal fluid was obtained. The facial paralysis was more marked and a left adduction strabismus was present. There was no evidence of either conjunctivitis or keratitis. During the same day the animal was unable to stand and later died in convulsions. No macroscopic lesions were observed at autopsy with the exception of one small focus of necrosis in the medulla. Microscopically, lesions typical of *E. monocytogens* infection were present in the mid-brain. The organism was isolated in pure culture from the mid-brain. Contrary to previous reports, it was found that the organism was more sensitive to penicillin than to streptomycin or chloromycetin when compared with a standard Oxford strain of *Staphylococcus H.*

Summary

Circling disease, *E. monocytogenes* encephalitis, in cattle is briefly reviewed. Two cases observed in this country are recorded.*

Acknowledgments.—I wish to thank Mr. B. Gale, in whose practice these cases were observed, Mr. A. D. Osborne and Mr. A. H. Linton for kindly carrying out the bacteriological examinations, and Professor A. Messervy for his assistance in the preparation of this paper.

* A further outbreak is at present being investigated. (Venn, 1954.)

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ABSTRACTS

Extracted Herbage Leaf Protein for Poultry Feeding*

I. Herbage cut during November from a pure sward of S.23 perennial ryegrass (then about 2 inch in height and in a green and leafy condition) was milled and pressed three times and the resultant juice was boiled and filtered. The ground precipitate from an original 750 lb. of wet herbage yielded 14·4 lb. of dry powder containing 37·5 per cent. crude protein, 8·6 per cent. soluble ash and 8·3 per cent of silica, the high proportion of silica being attributed to soil contamination.

This material was employed in a feeding trial involving Brown Leghorn × Light Sussex pullets initially nine months old and in full lay and selected from a flock folded on grass. A control group receiving 12·5 per cent. fish meal in its balanced mash was compared with an experimental group in which this fish meal was replaced by 18·5 per cent. leaf-protein and 1·5 per cent. mineral mixture. The grain allowance was the same for both groups.

Over a ten-week period there were no significant differences between the groups in terms of health, general condition, numbers of eggs and total egg weight. The only adverse effect of the leaf-protein was a high incidence of greenish albumens, which would probably have yielded " green yolks " on storage. Extraction of the chlorophyll was therefore suggested for future work with laying birds.

II. In two feeding trials with young chicks leaf-protein gave results equal to those from fish meal in the one (for which it was prepared from a lucerne-grass sward) and slightly inferior in the other (for which an alsike and ladino white clover was the starting source). It is believed that a mash composed of home-grown cereals plus leaf-protein with vitamin supplements, a balance of minerals and, if necessary, additional amino-acid, would be suitable for chick-rearing.

*Extracted Herbage Leaf Protein for Poultry Feeding. Hughes, G. P., & Eyles, D. E. (1953). *J. Agric. Sci.* **43.** 136–153.

III. The residue remaining after the extraction of the leaf-protein from herbage employed in I. was found to contain 25·7 per cent. dry matter, 16·2 per cent. crude protein, 0·26 per cent. P, 1·26 per cent. K and 1·13 per cent. Ca. It was found to be of low palatability for sheep, the maximum daily consumption by two-shear half-bred wethers being 2½ lb. per head daily. The average digestibility of the dry matter was 52·1 per cent. and that of the crude protein 57·6 per cent. There was no loss of bodyweight during feeding periods of 8 to 16 days and nitrogen balance determinations indicated that the material contained sufficient protein. It contained, however, barely sufficient K and inadequate amounts of P and Ca.

* * * * *

Feeding of Iodinated Protein and Thyroxine to Dairy Cows*

The effects of feeding iodinated protein and thyroxine to cows has been reviewed. Pure L. thyroxine is better than iodinated casein for increasing the milk yield in cows with a declining lactation. Treatment should not exceed eight weeks and thyroxine is best fed mixed with concentrates in cattle cubes in doses of 80 mg. per day. Total lactation is unaffected and the milk is free from active thyroxine. The cow requires additional food to supply the increased metabolism and extra milk.

*The Feeding of Iodinated Protein and Thyroxine to Dairy Cows. KAY, H. D. (1954). *Agriculture*. **60.** 564-568.

* * * * *

Synthetic Media Powder to Enhance Rumen Microfloral Growth and Activity*

A product, named "Profloran", devised in co-operation with the Jensen-Salsbery laboratories is a synthetic rumen media. The materials used, chemical ingredients known to favour bacterial growth, are unpublished and only available for experimental use. The media is made up into a powder to be used direct on the feed, or mixed with water for direct administration.

This preliminary report deals with clinical observations on the treatment of 139 cows. These were cases approaching terminal stages. Results based on field trials on cases of depressed toxic states, chronic acetonaemia, rumen impaction, forage poisoning, diarrheoa and dehydrated conditions, indicate benefit from early use.

This product would appear to open up a new field in the treatment of digestive disorders in ruminants, for though the transfer of cud from one cow to another can often prove beneficial, it is a troublesome procedure, and one which could also spread disease.

*Synthetic Media Powder to Enhance Rumen Microfloral Growth and Activity: Preliminary Report. WESTCOTT, R. W., MOORE, G. R., CONNOR, G. H., & RILEY, W. F. (1953). *Vet. Med.* **48.** 349–350.

REVIEW

[**Principles of Veterinary Science** (5th Edition). By FREDERICK BROWN HADLEY, D.V.M. Pp. 518. B. W. Saunders Company, Philadelphia and London.]

Whilst the tendency, at least in this country, is to produce more and more specialised books for the scientist, the increasing interest of the general public in matters scientific calls, on the other hand, for a type of book which may be described as an omnibus edition. An example well-known to our readers is that of Black's Veterinary Dictionary.

The terminology of the book under review clearly indicates that it is meant for the scientifically minded rather more than for any other class of reader, but in attempting to cover such a vast variety of subjects of major importance such as bacteriology, pathology, meat inspection, anatomy, etc., all within one volume, the book seems to fall between two stools, being too scientific and unpractical for the farmer, and yet not sufficiently comprehensive in any one field for the trained veterinarian or student who otherwise might be interested.

The feeding of the cow, calf, and bull, for instance, are dealt with on three pages, and the vast field of vitamins, whose place in nutrition needs no comment, is covered equally briefly. No references have been made to the highly important observations relating to vitamin E metabolism and muscular dystrophy. A comparison between the different forms of conjunctivitis in cattle, distinguishing that due to phenothiazine sensitisation from the rickettsial variety, would have been most helpful.

The section on bovine mastitis is by no means consistent with the importance of this disease, and is not sufficiently comprehensive. Far too little emphasis is paid to the importance of milking technique, and the various factors associated with possible injury; and too much is given to a clinical classification of the different types, particularly bearing in mind the lack of correlation between the ineffective agent present and the clinical symptoms revealed.

In connection with the white scour in calves, we should have liked to see a good deal more emphasis placed upon the importance of colostrum and at least a reference to its various fractions. The use of streptomycin might have been mentioned in this respect. To be of any value more details should have been given regarding the use of sodium fluoride in the treatment of round worms in pigs, a section which could be more adequately expanded. Finally, from recent work, it would seem that the use of molasses in the food of animals suffering from acetonaemia may well be contra-indicated and perhaps it would be better to couple protein with the carbohydrate when referring to the type of rations to be fed to animals suffering from this complaint.

Royal College of Veterinary Surgeons

ANIMAL MANAGEMENT EXAMINATION

LIST OF SUCCESSFUL CANDIDATES

MAY, 1954

EDINBURGH:

Nyun, Mya	Rodger, J. L.

DUBLIN:

Corcoran, M. P.	Mansfield, M. P. (credit)
Hoban, G. P.	Martin, W. H. (credit)
Jones, R. F. C.	O'Neill, Alexander
Kelleher, J. F. L.	Phelan, N. P.
McLaughlin, David	Sheahan, T. J.
Maher, James	White, J. E. C.

PHARMACOLOGY EXAMINATION

LONDON:

Blaxland, D. R.	
Gray, C. G.	Strang, R. D.
Jones, R. H.	Sutton, J. B.
Melluish, H. K.	Townsend, Miles
Peters, J. B.	Watson, Miss D. P.
Rutherford, L. H.	Wright, M. A.

DUBLIN:

Allan, R. S.	
Cotter, William	Kelleher, D. K.
Daly, D. J.	Lee, J. G.
Dolan, T. C.	Lowndes, J. D.
Fogarty, W. D. P.	Mangan, P. J.
Handcock, W. J.	Moloney, J. B.
Johnston, J. B.	Murphy, P. A.
Kelly, J. A.	O'Connor, J. J.

B.V.A. 72nd ANNUAL CONGRESS

Torquay, September 19th to 25th, 1954

LIST OF HOTELS

We publish below a list of the principal hotels in Torquay. The Congress centre, where the Annual Banquet and certain other Social Functions will be held, will be the Palace. In making their reservations members are advised to mention that they are visiting Torquay for the purpose of attending the Congress. Should none of the hotels listed below be suitable for members' requirements or should they have no accommodation form, a further list is available from the Torquay Hotels Association, 9, Vaughan Parade (Telephone 3367).

Name and address	Telephone	Rooms		Garage	Daily Terms
		Double	Single		
Abbey Lawn, Belgrave Crescent	2791	49	11	Car Park	25/6 to 32/6
Argyll Hall, Warren Road	4614	26	6	Yes	30/-
Carlton, Daddyhole Plain	7633	32	26	30 cars	30/- B. & B. 21/6
Conway Court, Warren Road	2088	26	8	Yes	42/-
Devonshire, Park Hill Road	4850	53	9	Lock-ups	21/-
Foxlands, Babbacombe	88072	31	12	20 cars	30/-
Grand, Torbay Road	2234	80	60	75 cars	42/- to 48/-
Imperial, Torquay	4301	60	60	50 cars	45/- to 65/- B. & B. 30/- to 45/-
Links, St. Marychurch	87211	16	19	Yes	35/-
Livermead House, Sea Front	4361	45	25	Yes	27/6 B. & B. 19/6
Osborne, Meadfoot Beach	2232	55	42	50 cars	36/- to 45/-
Oswald's, Babbacombe	88420	41	9	Yes	From 25/-
Palace, Torquay	2271	90	54	100 cars	41/- to 60/-
Palermo, Babbacombe	88442	24	3	Ample parking	27/6
Palm Court, Sea Front	4881	62	32	Near	From 25/-
Phyllis Court, Torbay Road	443311	30	9	Lock-ups and Parking	26/- to 42/-
Princes, Park Hill Road	2816	41	14	Yes	21/- to 36/-
Queens, Victoria Parade	4324	39	14	100 cars nearby	33/- to 39/-
Hotel Regina, Victoria Parade	2904	50	25	Yes	35/- to 42/-
Rising Sun, Belgrave Road	372011	3	1	Yes	21/-
Hotel Riviera, Park Hill Road	7174	38	12	Yes (9)	30/- to 42/-
Rosetor, Chestnut Avenue	4391	40	39	Yes	42/-
San Remo, Belgrave Road	3760	25	13	Parking	30/- to 39/-
Torbay, Torbay Road	2218	51	45	Yes	35/- to 45/- + 10% gratuities
Trecarn, Palermo Road, Babbacombe ...	870881	49	31	Yes	From 27/6
Victoria, Belgrave Road	7501	60	24	Adjacent	33/- to 50/-
All the above are licensed					
Ashley Court, Abbey Road	241711	21	5	Yes	15/- to 25/-
Anstey's Manor, Asheldon Road	3679	25	9	Parking	22/6 to 35/-
Babbacombe Bay, Downs Road	888711	20	7	Nearby	21/- to 27/6
Cavendish, Belgrave Road	3682	35	15	Parking	24/- to 30/-
Chelston Hall, Old Mill Road	65520	21	7	Parking	21/- to 30/-
Chillingworth, Belgrave Road	218511	36	8	Parking Free	27/- to 35/-
Collingwood, Braddons Hill Road E. ...	344811	23	2	Yes	18/- to 25/-
Cumberland, Braddons Hill Road	2379	30	10	Yes	21/- to 27/6
Derwent, Belgrave Road	3452	21	5	Yes	18/- to 27/6
Dorchester, Daddy Hole Plain	4155	57	3	Lock-ups	As Brochures, Less 20%
Elmington, St. Agnes Lane	65192	26	16	Yes and Parking	18/- to 30/-
Hazelwood, Belgrave Road	241411	21	4	Nearby	18/- to 25/-
Heywood Tower, Hr. Warberry Road ...	3837	30	10	—	From 30/-
Hove Mansions, Furze Hill Road	2307	26	4	Parking	21/- to 25/-
Kistor, Belgrave Road	3219	21	8	Adjoining	25/- to 35/-
Rock Walk, Torquay	208711	25	4	Adjacent	30/-
Roselea, Chestnut Avenue	3001	12	14	Yes	36/-
Roslin Hall, Belgrave Road	4373	36	14	Yes	30/- to 33/-
Sefton, Babbacombe	88400	40	8	Lock-ups	30/-
South Devon, Babbacombe	88742	22	6	Free Parking	18/6 to 25/6
Templestowe, Tor Church Road	4911	40	5	Parking	24/- to 30/-
Toorak, Chestnut Avenue	7135	60	40	Yes	From 24/-
Tourine, Tor Church Road	3394	30	7	Free Parking	From 18/-
Vernon Court, Warren Road	2676	35	15	Parking	27/- to 33/-
Villa Como, St. Lukes Road S.	3071	23	3	Yes and Parking	26/6
Wellswood Hall, Wellswood Avenue ...	3746	17	14	Lock-ups and Parking	21/-

QUESTIONS IN PARLIAMENT

Myxomatosis

Major Anstruther-Gray (May 13th) asked the Minister of Agriculture how far north the rabbit disease of myxomatosis has spread up to date.

Sir T. Dugdale: The most northerly outbreaks reported so far are on the Suffolk-Norfolk border, near Southwold and Mendham.

Major Anstruther-Gray: Has there been a noticeable spread in other directions?

Sir T. Dugdale: In addition to the answer to the question which I have given, I think that the House might like to know that there has been a notable spread, during the last three weeks or so, in East and South-East England. Isolated outbreaks have been confirmed in the Isle of Wight and during the last few days in Gloucestershire, Radnorshire and Cornwall.

Captain Duncan: Is my right hon. Friend aware that it was reported in the Press recently that some Cumberland butchers took rabbits from an infected area which were taken back to Cumberland? Can he say whether there has been any myxomatosis in Cumberland since then?

Sir T. Dugdale: Not so far as has been reported to me. So far as I can ascertain, there is no justification for these rumours.

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Dehorning of Calves

Sir A. Bossom (May 14th) asked the Minister of Agriculture if he will encourage the dehorning of calves when young, by paying a larger subsidy for dehorned beef calves than for horned ones, or make some other appropriate arrangement to prevent the loss caused by damage to carcases and hides by beasts with horns when being yarded and transported.

Sir T. Dugdale: Under the Calf Subsidy (England and Wales and Northern Ireland) Scheme, 1952, the present subsidy of £5 has been fixed for all eligible calves born up to October 29th, 1955. I will, however, review my hon. Friend's suggestion when I consider the provisions of any further Scheme.

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Slaughterhouses

Sir A. Bossom (May 14th) asked the Minister of Food if he is now satisfied that there will be adequate slaughtering facilities to meet requirements when meat is decontrolled; and what further provision he proposes to meet the situation.

Major Lloyd George: This is a duty which has been put upon local authorities, and I think that, in consultation with the local interests concerned, they are handling it generally with a resolve to ensure that sufficient facilities will be available. As I have previously stated, the situation can only be met by bringing into use very many of the pre-war slaughterhouses and I trust that local authorities will exercise their licensing powers wherever necessary.

NOTES AND NEWS

Diary of Events

May 26th.—Meeting of the Southern Counties Division, B.V.A., at the Polygon Hotel, Southampton, 6.30 p.m.

May 26th.—Annual General Meeting of the Society of Women Veterinary Surgeons. (See notice for details.)

May 27th.—General Meeting of the Herts and Beds Division, B.V.A., at the George Hotel, Luton, 7.30 p.m.

May 27th.—Meeting of the Sub-committee *re* Nutrition Conference at 7, Mansfield Street, W.1, 11 a.m.

May 27th.—Meeting of the Technical Development Committee at 7, Mansfield Street, W.1, 2.15 p.m.

May 27th.—Annual General Meeting of the Dumfries and Galloway Division, B.V.A., at the Red Lion Hotel, Botchergate, Carlisle, 2 p.m.

May 28th.—Ordinary Meeting of the Royal Counties Division, B.V.A., at the Bull's Head Hotel, Aylesbury, 2.30 p.m.

June 1st.—One hundred and eleventh Annual General Meeting of the Royal College of Veterinary Surgeons at 10, Red Lion Square, London, W.C.1, at 12 noon.

June 1st.—Annual General Meeting of Victoria Veterinary Benevolent Fund at Royal College of Veterinary Surgeons, 10, Red Lion Square, W.C.1, to follow the above meeting.

June 9th.—Meeting of the Scottish Metropolitan Division, B.V.A., at the Minden Hotel, Peebles, 2.30 p.m.

June 10th.—President's invitation Luncheon and General Meeting of the Midland Counties Division, B.V.A., at the Penns Hall Hotel, Sutton Coldfield. Luncheon 1 p.m., Meeting 2.30 p.m.

June 11th.—Annual Dinner of the R.A.Y.C. Officers Club at the Grosvenor House, Park Lane, London, W.1.

June 23rd.—Summer Meeting of the Royal Society of Medicine, Section of Comparative Medicine, at the Rothamsted Experimental Station, Harpenden, Herts, 10.45 a.m.

Sept. 19th—25th.—72nd Annual General Meeting and Congress of the British Veterinary Association at Torquay.

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July Meetings of Council and Committees, B.V.A.

Wednesday, July 21st, 1954:—

11.0 a.m. Organising Committee.
2.0 p.m. Home Appointments Committee.
3.30 p.m. Parliamentary and Public Relations Committee.
At 7, Mansfield Street, Portland Place, W.1.

Thursday, July 22nd, 1954:—

10.30 a.m. Veterinary State Medicine Committee.
1.45 p.m. Finance Sub-committee.
2.30 p.m. General Purposes and Finance Committee.
At 7, Mansfield Street, Portland Place, W.1.

Friday, July 23rd, 1954:—

10.30 a.m. Council Meeting.
At the Connaught Rooms, Great Queen Street, W.1.

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R.C.V.S. Examinations

Thursday, June 10th.—D.V.S.M. Written Examinations commence at Edinburgh.
Monday, June 14th.—D.V.S.M. Orals and Practicals commence.
Thursday, June 24th.—M.R.C.V.S. Written Examinations.
Friday, June 25th.—Ditto.
Monday, June 28th.—M.R.C.V.S. Practical and Orals commence (Panels " A " and " B ").

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PERSONAL

Births.—Archard.—On May 12th, 1954, at High Wycombe, Bucks, to Margaret (Peggy) (*née* Wright) wife of Mellis Archard, M.R.C.V.S., a son.

Greig.—On April 29th, 1954, at Aberdeen, to Margaret (*née* Cooper, M.R.C.V.S.), wife of Dr. Alastair Greig, B.Sc., M.R.C.V.S., a daughter—Anne Margaret.

Mitchell.—On May 12th, 1954, at Leeds, to Helen (*née* Quinney), wife of A. W. Mitchell, M.R.C.V.S., 213, Kirkstall Road, Leeds, a daughter—Susan Anne.

Pengelly.—On May 14th, 1954, at The Gables, Thorpe Road, Peterborough, to Kathleen Joan, wife of James Pengelly, M.R.C.V.S.—a son.

SWARBRICK.—On May 4th, 1954, to Ann, wife of Olaf Swarbrick, M.R.C.V.S., of Ashcott, Bridgwater, Somerset, a daughter—Alison.

WOOD.—On May 15th, 1954, at Moorcroft, Reepham, to Heather (*née* Birks) wife of John G. P. Wood, M.R.C.V.S.—a son.

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Marriage.—TEAKLE—BURNS.—At the Church of Our Lady of Lourdes, Cambridge Park, Wanstead, on April 21st, 1954, John Anthony Teakle, M.R.C.V.S., only son of Mr. and Mrs. Teakle, of Nutbourne, Chichester, Sussex, to Mary Marcia Burns, daughter of Mr. and Mrs. Burns, 3, Bedford Road, South Woodford, E.18. Mr. A. R. Brown, M.R.C.V.S., was best man.

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Forthcoming Marriages.—HOWARD—KENSIT.—The engagement is announced between Robert William Howard, M.R.C.V.S., son of Mr. and Mrs. A. C. Howard, of Chetnole, Nr. Sherborne, and Jennie May Kensit, daughter of the late Mr. J. Kensit and Mrs. S. Kensit, of Hampstead.

MORGAN—ROBERTS.—The engagement is announced between Thomas Lewis Alwyn, M.R.C.V.S., elder son of Mr. and Mrs. D. Morgan, Gwerngwyne, Cynghordy, Llandovery, and Gwen, elder daughter of the late Mr. R. P. Roberts, J.P., and of Mrs. Roberts, Arthog, Merioneth.

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Appointments in the Colonial Veterinary Service.—Mr. G. D. Shaw, M.R.C.V.S., has been appointed Chief Veterinary Research Officer, Northern Rhodesia, and Mr. G. D. Stockwell, M.R.C.V.S., has been posted as a Veterinary Officer for Tanganyika.

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R.C.V.S. Council Elections

The Registrar of the Royal College of Veterinary Surgeons wishes to remind members who have not yet voted that the completed papers should be posted to reach him *not later than Monday, May 24th*, 1954.

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HOSPITALITY REQUIRED

An Austrian woman student of the Veterinary College, University of Vienna, has written asking if she could see practice both in England and Scotland during the summer vacation this year, between July 15th and September 15th. In return for hospitality would be willing to help in any way she could.

Members who may be interested in either of these suggestions are asked to write to the General Secertary, B.V.A., 7, Mansfield Street, London, W.1.

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SCOTTISH MUNICIPAL ELECTIONS AND CIVIC HONOURS

Among successful candidates in the Municipal Elections recently held in Scotland was Mr. James Nisbet, M.R.C.V.S., Forfar. He was a former member of the Burgh Council. The President-Elect of this Division, Mr. H. F. M. Aitken, M.R.C.V.S., Banchory, was honoured recently by being re-elected Dean of Guild of the Burgh of Banchory.

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VETERINARY SPEAKERS IN ABERDEEN

A public meeting, organised by the North of Scotland College of Agriculture in conjunction with the North of Scotland Division, B.V.A., was held in the Northern Hotel, Aberdeen, on April 29th, and was well attended by farmers, veterinary surgeons and others interested in agriculture.

The chief speakers were Dr. E. L. Taylor, M.R.C.V.S., D.V.H., Weybridge, who spoke on "The association between worm disease and the management of grazing animals," and Mr. J. S. S. Inglis, B.SC., M.R.C.V.S., Glasgow, whose subject was "Calf management in relation to disease." The meeting closed with the showing of a film "Warble-flies in cattle," kindly lent by the Ministry of Agriculture.

Mr. Maitland Mackie, Chairman of the Board of Governors of the North of Scotland College of Agriculture, was in the chair, and in his opening remarks he praised the good relations and the spirit of close co-operation which existed between farmers and the veterinary profession in the north of Scotland. Mr. W. J. B. Robson, President, represented the North of Scotland Division, B.V.A., on the platform.

Both papers received a good hearing and were followed by numerous questions and lively discussion.

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REFRESHER COURSES

The Organising Committee of the Association has been enquiring into the possibility of refresher courses being provided for (*a*) graduates returning from national service in the Forces, and (*b*) veterinary surgeons in general practice wishing to keep up to date with modern developments. A summary is given below of the help so far promised, subject to further discussion of details.

Certain of the University Veterinary Schools are prepared to take a few ex-national service and other veterinary surgeons for varying periods during term-time. Those accepted would, for example, take lectures and practical courses with final year students. One school already runs a general clinical course, and recently announced the holding, this autumn, of a course in clinical laboratory methods.

A research organisation, which has an already well-established and popular refresher course covering bovine infertility, is willing to consider names for inclusion on its waiting list. Two others are prepared to arrange courses covering a period of one week. One course would cover such subjects as anthelmintics and their uses, the various methods of applying insecticides, and poultry diseases, and would include the showing of general films covering parasitic problems. The second would be a short course in modern methods of treatment, with particular regard to chemotherapy and the use of antibiotics. Advice would be given also in laboratory and *post-mortem* diagnosis.

To enable the Association to judge the probable demand, will members interested kindly send their names to the General Secretary, B.V.A., 7, Mansfield Street, Portland Place, W.1, indicating which of the courses referred to they would prefer to take if suitable arrangements can be made. Suggestions for other courses will receive consideration.

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FOWL PEST—RESTRICTIONS ON MOVEMENT OF POULTRY IN MID-LANCASHIRE

A large number of outbreaks of fowl pest continue to occur in the central parts of Lancashire. With a view to bringing the situation under more effective control, the Minister of Agriculture and Fisheries, after consultation with representatives of the poultry industry in the county, has made an Order entitled The Live Poultry (Mid-Lancashire) Order, 1954. The main effect of this Order, which came into force on May 17th, is to prohibit the movement of live poultry (except day-old chicks and hatching eggs) into, out of, and within the area of central Lancashire specified below. The prohibition does not apply to poultry consigned into and out of the area by rail on a through booking.

Local authorities may, however, grant licences authorising the movement within the area of poultry intended for immediate slaughter provided there are no poultry other than for immediate slaughter on the premises to which the birds are to be moved. The licensee must distinguish the birds authorised to be moved by clipping back their tail feathers as prescribed in the Order. The poultry may not leave alive the premises to which they are delivered. Markets, fairs and sales of poultry in the mid-Lancashire area may be held only for poultry for immediate slaughter, and then only under licence by the local authority. Exhibitions of poultry are prohibited.

The Minister will be prepared, after the lapse of a suitable period and in the light of the trend of fowl pest in the scheduled area, to consider exceptionally the issue of licences under his general powers authorising the movement out of the area of breeding stock of poultry from the premises of accredited poultry breeders, and perhaps of other breeders. An announcement as to

the time and form of such applications will be made later. In addition, the Minister will consider forthwith the issue, in exceptional circumstances, of licences for essential movement (*e.g.*, for the purpose of restocking) of store poultry. Applications should be addressed to the Divisional Veterinary Office, 26, Winckley Square, Preston.

SCHEDULED AREA

An area comprising the County Boroughs of Blackburn, Blackpool and Preston.

Administrative County of Lancaster.—The Boroughs of Fleetwood, Lytham St. Annes and Chorley. The petty sessional divisions of Garstang, Kirkham, Leyland and Walton le Dale.

Petty Sessional Division of Blackburn.—The parishes of Ribchester, Clayton le Dale, Ramsgreave, Osbaldeston, Balderstone, Mellor, Pleasington and Livesey, and so much of the parish of Samlesbury as lies within the petty sessional division.

Petty Sessional Division of Leyland Hundred.—The parishes of Hesketh with Becconsall, Tarleton, Bretherton, Ulnes Walton, Euxton, Whittle le Woods, Brindle, Hoghton, Withnell, Wheelton, Heapey, Heath Charnock, Charnock Richard, Heskin, Eccleston, Croston, Rufford, Mawdesley, Bispham, Coppull, Adlington and Anderton.

Petty Sessional Division of Wigan.—The parishes of Parbold, Wrightington and Worthington.

Petty Sessional Division of Amounderness.—The parishes of Goosnargh, Barton, Woodplumpton, Broughton, Whittingham, Dilworth, Lea, Fulwood, Haighton, Grimsargh, Alston and Hothersall.

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DRUMMOND MEMORIAL FELLOWSHIP

Readers may recall that a committee was formed some time ago under the chairmanship of Lord Woolton to raise funds for a memorial to the late Sir Jack Drummond. The financial position now makes possible the award of the first Fellowship—which is the form the memorial is to take—and the Trustees hope it may be possible for the first Fellow to begin work in October this year. The stipend is at the rate of £900 per annum. It will continue in the first instance for a period of one year, and probably be continued during a second year.

The scientist appointed will undertake research on nutrition, with special emphasis on human nutrition. Veterinary graduates who are interested in applying for the Fellowship are asked to send seven copies of their application to the Chairman, Drummond Trust, c/o The Provost, University College of London, Gower Street, W.C.1.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

ANTHRAX:

Argyll.—Killellan Farm, Toward, Dunoon (May 12).
Ches.—Arclid Cottage Farm, Arclid, Sandbach (May 12).
Cumberland.—Bolton Park, Mealsgate, Carlisle (May 15).
Derby.—Farley Farm, Farley, Matlock (May 13).
Isle of Ely.—Willow Farm, Murrow, Wisbech (May 10).
Kent.—Sewage Farm, Edenbridge (May 13).
Lancs.—Chingle House Farm, Goosnargh, Preston (May 11).
Wilts.—Church Farm, Urchfont, Devizes (May 10).

FOWL PEST:

Lancs.—Woodlands and The Glen, Ratten Lane, Hutton, Preston; Almond Farm, Gt. Eccleston, Preston (May 11); Black Horse Cottage, Town Lane, Much Hoole; Hillock Farm, Knoll Lane, Little Hoole; "Woodlands," Gt. Eccleston, Preston; Reedley Top Farm, Brierfield, Nelson (May 13).

Norfolk.—Park Farm, Witton, North Walsham; Hill House Farm, Forncett St. Mary, Norwich (May 12); Hill Farm, Forncett St. Mary and Chapel Farm, Forncett St. Mary (May 15).

SWINE FEVER:

Bucks.—Shenley Piggeries, Shenley Brook End, Bletchley (May 10).

Cambs.—Church Farm, Dry Drayton (May 10); Orchard House, Christchurch, Wisbech (May 11).

Ches.—Hollyheath Farm, Someford Booths, Congleton; Ridley Farm, Ridley, Tarporley (May 10); Buildings at Wardle Aerodrome, Wardle Hall, Wardle; Edleston Hall, Edleston, Nantwich; Tunstead Knoll Farm, Kettleshulme, Stockport; Packsaddle House, Chelford Road, Prestbury, Macclesfield (May 11); Wych Fold, Gee Cross, Hyde (May 13); Leadgate Farm, Haxley, Chester; Oak Farm, Shavington, Crewe (May 14); Light Hey, Buglawton, Congleton; Stud Farm, Oakmere, Sandiway, Northwich (May 15).

Essex.—"Ramadi," Berwick Road, Rainham (May 11).

Lancs.—Abbey Farm, Burscough, Ormskirk; Travers Farm, Travers Entry, Bold (May 10); 54, Chapel Lane, Latham, Ormskirk (May 14).

Norfolk.—Bellrope Lane, Wymondham (May 10).

Notts.—The Ferry Inn, Wilford, Nottingham (May 11).

Salop.—1a, Belton Road, Whitchurch (May 11); Soudley Park, Cheswardine, Market Drayton (May 13); Park Heath Farm, Cheswardine, Market Drayton; Belton Farm, Whitchurch (May 14).

Staffs.—Bromely Hall, Eccleshall, Stafford (May 10); Old Hag Farm, Heaton, Rushton; Leasowes Farm, Haughton, Stafford (May 12).

Suffolk.—Ashby Hall, Ashby, Lowestoft (May 10); Hill Farm, Sproughton, Ipswich (May 13).

Yorks.—No. 3, Smallholding, Sproatley Road, Preston, Hull (May 12); Blamire Farm, Everingham (May 14).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

HOSPITALITY OFFERED AT "THE ROYAL"

Sir,—The Royal Counties Show is being held on June 23rd to 26th inclusive at Salisbury. One entrance to the show ground is within 150 yards of my house and surgery, and if any members of the Association would care to use the premises for receiving or leaving messages, as a meeting place, or for a wash and brush up at any time other than 9 a.m. to 10 a.m. and 6 p.m. to 7 p.m. (consulting hours) I shall be very pleased to see them.—Yours faithfully, PETER J. DALTON, Old Sarum House, Stratford Road, Salisbury. *May 12th*, 1954.

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CANINE VESICULAR DERMATITIS

Sir,—I was very interested in Mr. Jennings's article on Canine Vesicular Dermatitis, which appeared in *The Veterinary Record* of March 6th.

It is somewhat surprising that while referring to *Herpes simplex* the author did not mention pemphigus in his differential diagnosis. *Herpes simplex*, so far as I know, has never been recorded as a spontaneous skin disease in dogs, but a number of references may be found in the veterinary literature to pemphigus, which is a well-known skin disease of man, and is now, I think, generally accepted to be of viral aetiology.

While Nieberle & Cohrs (1952) also state that pemphigus is caused by a virus and is transmissible to various experimental animals, he disbelieves a spontaneous occurrence of it in animals. This view is opposed, however, by a number of authors: Kral & Novak (1953), Wirth (1949), Hutyra, Marek & Manninger (1946) and Wooldridge (1935), all of whom describe this condition in the dog and some also in other animals.

The similarity between the clinical picture of Mr. Jennings's cases and that of pemphigus in dogs is so striking that attention should be drawn to it. In both conditions superficial skin blisters are found which later rupture and are accompanied by considerable pruritus. Both conditions are chronic and tend to recur after varying periods. A predilection site, as described by Mr. Jennings, has not been recorded in pemphigus by any of the above authors.

Although Mr. Jennings has made a very valuable contribution to the understanding of this disease by his detailed and lucid description, it does seem rather superfluous to coin a new term, if in fact the two conditions prove to be identical.

It may be worthy of mention that human pemphigus is now being treated with apparent success with ACTH and cortisone preparations. This line of treatment might be tried also in canine pemphigus.—Yours faithfully, W. G. Siller, 11, Leslie Place, Edinburgh. *May 10th*, 1954.

References

Hutyra, F., Marek, J., & Manninger, R. (1946). "Special Pathology and Therapeutics of the Diseases of Domestic Animals." 5th English Edition. **3.** 565. London: Baillière, Tindall & Cox.

Kral, F., & Novak, B. J. (1953). "Veterinary Dermatology." 177. Philadelphia: Lippincott.

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Wirth, D. (1949). "Lexikon der praktischen Therapie und Prophylaxe für Tierärzte." **2.** 737. Wien: Urban & Schwarzenberg.

Wooldridge, G. H. (1935). "Encyclopaedia of Veterinary Medicine, Surgery and Obstetrics." **2.** 679. Oxford University Press.

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FROZEN SPERMATOZOA

Sir,—We should like to support Dr. Parkes's efforts (his letter published in your columns on March 6th, 1954) to protect the reader unfamiliar with work on freezing spermatozoa from drawing "erroneous inferences."

Glycerol has been used since 1912, at least, for protecting biological materials against the adverse effects of freezing (Maximov, 1912). Rostand (1946) mentioned in a recent review by Polge & Parkes (1952), seems to have been the first to use it successfully with (frog) spermatozoa and demonstrated its protective action on these particular cells.

We make no claims about priority in obtaining living offspring from the frozen spermatozoa. We do claim, however, that the method we published earlier (Emmens & Blackshaw, 1950) gives fertile ram and bull spermatozoa, although we were tardy in demonstrating the fact. We also claim that the points raised in our letter of November 11th, 1953, are less likely to mislead the uninitiated than a complete omission of any reference to our work as in the 1953 symposium of the Society for Animal Breeding.

We have worked primarily with ram spermatozoa, which to the best of our knowledge have not been frozen by Dr. Parkes and his colleagues. Indeed, no method described by them gives other than very poor revival in this species.—Yours faithfully, A. W. Blackshaw, *Research Fellow;* C. W. Emmens, *Professor of Veterinary Physiology*, University of Sydney, Department of Veterinary Physiology. *May 5th*, 1954.

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Emmens, C. W., & Blackshaw, A. W. (1950). *Aust. Vet. J.* **26.** 226

Maximov, N. A. (1912). *Ber. dtsch. bot. Ges.* **30.** 52.

Polge, C., & Parkes, A. S. (1952). *Anim. Breeding Abst.* **20.** 1.

Rostand, J. (1946). *C.R. Acad. Sci. (Paris)*, **222.** 1524.

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DISPLACEMENT OF THE BOVINE RUMEN

Sir,—In view of the recent clinical communication of H. F. Hebeler on Displacement of the bovine abomasum I feel that the following case may be of interest:—

I attended an attested Friesian first-calf heifer, 4½ months in calf, on May 5th, 1954. The owner stated that she had not been eating very much during the past three days. She had been turned out to grass with the rest of the herd a few days previous to the illness.

The general appearance, as she stood tied, was fairly normal, her back was slightly arched, temperature 101·5° F., pulse 80, respiration normal, rumination in abeyance. There was slight tympany in the left flank. According to the owner she was passing dung and urine normally. No rectal examination was made. Pinching the withers region or poking between the ribs did not cause grunting. Her gait, when turned out into the yard, was not quite so relaxed as that of a normal cow.

A diagnosis of indigestion due to change of feeding was made and was considered as an unlikely possibility. S.A.N.V. powder was given for treatment, and I visited two days later. According to the owner, the heifer's appetite returned to normal after two doses of the powder but had fallen off again. Her appearance now was slightly dejected and she seemed to be in a certain amount of pain. Temperature was 102° F., pulse 85 and respiration normal. Left flank tympany was slight as before. The following morning the heifer was somewhat more dejected, though far from distressed, and respirations were still normal. The left flank tympany was now more marked but not excessive—temperature and pulse were not recorded. Exploratory laparotomy was proceeded with in the left flank.

When the peritoneum was incised the wall of the abomasum, which, unknowingly, was lying below the peritoneum, was partly cut into though not penetrated. An assistant withdrew that portion of the abomasum which was protruding through the muscle incision and I opened it, making an incision about 6 inches long. Green fluid spurted out and there was an outrush of gases. The peritoneal surface of the abomasum showed acute congestion and the assistant had to be careful not to puncture it with his fingers whilst holding it out in this condition. I stitched it up, and on release it fell out of sight ventrally into the abdomen An impacted rumen was now revealed in the operation site. I opened this and removed a barrow-full of fairly solid ingesta. The various layers were sutured. No drugs were administered except intramammary penicillin to the muscle layers.

The heifer was kept on a light diet for three days. From the second day she was looking for food and appeared normal. Her appetite was normal from then onwards and the stitches were removed a week later.—Yours faithfully, C. Steele, 83, Station Road, Tunstall, Stoke-on-Trent. *May 9th*, 1954.

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THE MARKETING AND TRANSPORT OF ANIMALS

Sir,—I was very interested to read Mr. King's article on "The Marketing and Transport of Animals" and the subsequent letter by Mr. Kirkwood on the same subject. I am afraid I cannot view with the same complacency the question of animal welfare at markets as does Mr. Kirkwood.

Let me say at the outset that most markets are well managed and every consideration given to the animals' welfare. This is true of almost all pedigree sales; the black spots are some of the weekly local markets, where the handling of animals is sometimes inhuman in the extreme.

There are three things which stand out as particularly bad and in need of improvement:—

1. The handling of young calves in the first week of life. I have seen drovers emptying a cattle float full of young calves by the crude method of driving them down the lorry ramp with sticks, despite the fact that some, only 24 hours old, could hardly stand, never mind walk down a steep ramp. In one instance I saw five calves, in a float of 30, fracture their limbs when subjected to such treatment. Once in the market such calves seem always to be given the coldest and draughtiest corner in the place.

2. The handling of young ponies at certain types of sales, usually connected with local fairs. In order to give the prospective purchaser an impression of life and spirit, the ponies are herded in bunches while a drover shouts and cracks a whip causing them ceaselessly to move round, kicking and bucking with fear. This results in bruised and injured legs. England is the culprit here; I have never seen similar sales in Scotland.

3. The loading and unloading of animals from coastal vessels. Here Scotland is the culprit and the handling of livestock at some West Highland piers is a disgrace. Barking dogs, shouting men and much stick wielding seem to be an essential part of any livestock movement. On frequent occasions I have seen panic-stricken animals finish up in the water.

Finally, I would ask one favour of the auctioneers, which would go a long way to remedy conditions. Ban from the market the unofficial drover, the man who, for the price of a drink, assists the farmer with his animals. These men are often very undesirable types, who seem to take a positive pleasure in beating the animals!—Yours faithfully, Stewart Macfarlane, Englewood, Kilmacolm, Renfrewshire. *May 4th*, 1954.